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KIOSK IMAGE PROCESSING SYSTEM

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CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application, titled "Kiosk Image Processing System," serial number 60/423,210, filed November 1, 2002, which is hereby incorporated by reference in its entirety.

BACKGROUND

[0002] At one time or another, a person has a photograph that they wish to be enlarged such as to a poster size. Typically, the photograph would be taken to a photo lab or photograph processing store where the photograph is dropped off. Hours or even days later, a poster size duplicate is generated. The person would then return to the photo lab and retrieve the poster size duplicate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate various example systems, methods, and so on that illustrate various example embodiments of aspects of the invention. It will be appreciated that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent one example of the boundaries. One of ordinary skill in the art will appreciate that one element may be designed as multiple elements or that multiple elements may be designed as one element. An element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

[0004] Figure 1 illustrates an example kiosk image processing system.

[0005] Figure 2 illustrates an example methodology of generating a large format image from a kiosk image processing system.

[0006] Figure 3A illustrates an example system diagram of one embodiment of a kiosk system.

[0007] Figure 3B illustrates another example system diagram of another embodiment of a kiosk system shown in Figure 3A.

[0008] Figure 4 is another embodiment of a kiosk imaging system with network capabilities.

[0009] Figure 5 is an example methodology of generating a large format image.

[0010] Figure 6 illustrates an example computing environment in which example systems and methods illustrated herein can operate.

DETAILED DESCRIPTION

[0011] The following includes definitions of selected terms employed herein. The definitions include various examples and/or forms of components that fall within the scope of a term and that may be used for implementation. The examples are not intended to be limiting. Both singular and plural forms of terms may be within the definitions.

[0012] "Computer-readable medium", as used herein, refers to a medium that participates in directly or indirectly providing signals, instructions and/or data. A computer-readable medium may take forms, including, but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media may include, for example, optical or magnetic disks and so on. Volatile media may include, for example, optical or magnetic disks, dynamic memory and the like. Transmission media may include coaxial cables, copper wire, fiber optic cables, and the like. Transmission media can also take the form of electromagnetic radiation, like those generated during radio-wave and infra-red data communications, or take the form of one or more groups of signals. Common forms of a computer-readable medium include, but are not limited to, a floppy disk, a flexible disk, a hard disk, a magnetic tape, other magnetic medium, a CD-ROM, other optical medium, punch cards, paper tape, other physical medium with patterns of holes, a RAM, a ROM, an EPROM, a FLASH-EPROM, or other memory chip or card, a memory stick, a carrier wave/pulse, and other media from which a computer, a processor or other electronic device can read. Signals used to propagate instructions or other software over a network, like the Internet, can be considered a "computer-readable medium."

[0013] "Data store", as used herein, refers to a physical and/or logical entity that can store data. A data store may be, for example, a database, a table, a file, a list, a queue, a heap, a memory, a register, and so on. A data store may reside in one logical and/or physical entity and/or may be distributed between two or more logical and/or physical entities.

[0014] "Logic", as used herein, includes but is not limited to hardware, firmware, software and/or combinations of each to perform a function(s) or an action(s), and/or to cause a function or action from another component. For example, based on a desired application or needs, logic may include a software controlled microprocessor, discrete logic like an application specific integrated circuit (ASIC), a programmed logic device, a memory device containing instructions, or the like. Logic may also be fully embodied as software. Where multiple logical logics are described, it may be possible to incorporate the multiple logical logics into one physical logic. Similarly, where a single logical logic is described, it may be possible to distribute that single logical logic between multiple physical logics.

[0015] An "operable connection", or a connection by which entities are "operably connected", is one in which signals, physical communication flow, and/or logical communication flow may be sent and/or received. Typically, an operable connection includes a physical interface, an electrical interface, and/or a data interface, but it is to be noted that an operable connection may include differing combinations of these or other types of connections sufficient to allow operable control. For example, two entities can be operably connected by being able to communicate signals to each other directly or through one or more intermediate entities like a processor, operating system, a bus, a logic device, software, or other entity. Logical and/or physical communication channels can be used to create an operable connection.

[0016] "Signal", as used herein, includes but is not limited to one or more electrical or optical signals, analog or digital, one or more computer or processor instructions, messages, a bit or bit stream, or other means that can be received, transmitted and/or detected.

[0017] "Software", as used herein, includes but is not limited to, one or more computer or processor instructions that can be read, interpreted, compiled, and/or executed and that cause a computer, processor, or other electronic device to perform functions, actions and/or behave in a desired manner. The instructions may be embodied in various forms like routines, algorithms, modules, methods, threads, and/or programs including separate applications or

code from dynamically linked libraries. Software may also be implemented in a variety of executable and/or loadable forms including, but not limited to, a stand-alone program, a function call (local and/or remote), a servelet, an applet, instructions stored in a memory, part of an operating system or other types of executable instructions. It will be appreciated by one of ordinary skill in the art that the form of software may be dependent on, for example, requirements of a desired application, the environment in which it runs, and/or the desires of a designer/programmer or the like. It will also be appreciated that computer-readable and/or executable instructions can be located in one logic and/or distributed between two or more communicating, co-operating, and/or parallel processing logics and thus can be loaded and/or executed in serial, parallel, massively parallel and other manners.

[0018] Suitable software for implementing the various components of the example systems and methods described herein include programming languages and tools like Java, Pascal, C#, C++, C, CGI, Perl, SQL, APIs, SDKs, assembly, firmware, microcode, and/or other languages and tools. Software, whether an entire system or a component of a system, may be embodied as an article of manufacture and maintained as part of a computer-readable medium as defined previously. Another form of the software may include signals that transmit program code of the software to a recipient over a network or other communication medium.

[0019] Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a memory. These algorithmic descriptions and representations are the means used by those skilled in the art to convey the substance of their work to others. An algorithm is here, and generally, conceived to be a sequence of operations that produce a result. The operations may include physical manipulations of physical quantities. Usually, though not necessarily, the physical quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a logic and the like.

[0020] It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like. It should be borne in mind, however, that these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, it is appreciated that throughout the description, terms like processing, computing, calculating, determining, displaying, or the

like, refer to actions and processes of a computer system, logic, processor, or similar electronic device that manipulates and transforms data represented as physical (electronic) quantities.

[0021] Illustrated in **Figure 1** is one embodiment of a kiosk image processing system **100** configured to generate print images on-demand. In one example, the kiosk **100** can receive a image **105**, like a photograph, from a user and generate an enlarged hard copy image **110** (also referred to as an output image) of the photograph in a selected size. For example, a small photograph can be scaled to a poster size and printed for the user while substantially retaining the characteristics of the original photograph. Thus, the kiosk **100** can provide an easy to use system that can generate one or more large format printed images on-demand within a relatively short processing timeframe. In one embodiment, the kiosk **100** includes computer processing logic that can be configured as a special purpose computer to perform desired functions and/or actions.

[0022] With further reference to **Figure 1**, the kiosk **100** can include an image input device **115** configured to receive physical images (e.g., photographs, documents, and the like) that are desired to be reproduced by a user. The image input device **105** can also be configured to received image data in electronic form such as from a computer-readable medium. In one example the image input device **115** includes a scanner that can scan the physical image **105** and generate digital image data. An image processing logic **120** can be configured to process the digital image data to modify characteristics or properties of the image data. For example, the digital image data can be processed in accordance with one or more configurable settings or options that can be selected by the user, settings set as system defaults, and/or settings that are programmatically determined based on the quality of the inputted image **105**, resolution, or other attributes that may help retain the resolution and other characteristics of the inputted image **105**. One selectable option can include a desired size of the output image **110**.

[0023] To generate the output image **110**, an image forming system can be provided such as a large format print system **125** configured to print images on large format print media. The large format print system **125** can be operably connected internally or externally to the kiosk **100** or can be a stand-alone device. In one example, the large format print system **125** includes an inkjet printing mechanism capable of printing poster-size images on 24 inch by 36 inch sized print media. Other types of printing mechanisms can be used like those

described below and of course, other sizes of output images can be created. In this manner, a user can generate enlarged sized duplicates of photographs or other images with the kiosk image processing system **100** that may be conveniently located in any public location.

[0024] With reference to **Figure 2**, an example methodology **200** is illustrated that can be associated with printing images on-demand with a kiosk imaging system. The example methodology **200** can initiate once a user activates the kiosk or otherwise initiates use of the kiosk. A physical image can first be inputted and received (**Block 205**) which is an image the user desires to have enlarged. Of course, it will be appreciated that the image can also be received in electronic form such as by receiving image data from a computer-readable medium. A digital image of the inputted image is generated (**Block 210**). Step **210** may not be required if the inputted image is inputted in electronic form. The digital image is then converted to a selected enlarged size (**Block 215**). Other types of image processing can also be performed on the digital image such as adding or combining the image with other image effects, adding text, modifying the properties of the image such as its lightness, darkness, contrast or other properties. It will be appreciated that many image processing options are available and that the described examples are not intended to be limiting.

[0025] Once the image data is processed and enlarged, the enlarged size of the digital image is printed on-demand (**Block 220**). In another example, the methodology can include prompting and receiving payment for the printing services as a condition for printing the image. The receipt of payment will be described in greater detail in other examples below.

[0026] Illustrated in **Figure 3** is another example of a kiosk system **300** that is configured to generate on-demand large format images from a selected image. For example, the kiosk system **300** can generate a poster size image of a photograph within a short time period, e.g. a few minutes. The kiosk system **300** can be a processing device that includes components similar to a computer system. For example, it can include one or more processors, an operating system, memory, storage, network communications logic (Intranet/Internet), a display, and other components as desired. The kiosk **300** can be configured to process user requests and to generate large format images on demand.

[0027] The kiosk system **300** can include a user interface **305** configured to communicate with a user to provide information to the user and receive information from the user. The user interface **305** may include a touch screen display and logic that communicates between

the touch screen and the operating system of the kiosk **300**. Of course, other types of input devices may be included such as a keyboard, mouse, or other input device. The user interface **305** can also include a display and logic configured to provide a preview image before actually printing a hardcopy enlarged image.

[0028] In order to generate a large format image, the user can input an original image, for example a photograph, into the kiosk **300** through an image input device **310**. The image input device **310** may include a scanner that scans a physical photograph into electronic form. The image input device **310** can also include a device for reading and/or received data from a computer-readable medium such as a floppy disc drive, optical drive, memory card reader, digital camera, data communications logic, or other device that can process electronic data.

[0029] Image processing logic **315** is configured to process the inputted image to a final printing state which can then be printed on a large format medium. For example, image manipulation logic **320** can be configured to manipulate and change the characteristics of an image based on user-selected options. In that regard, the image processing logic **315** can include logic that communicates with the user interface **305** to direct the user through a variety of options using an easy-to-use tutorial style selection process with optional audio assistance. For example, through the user interface **305**, the kiosk can present a variety of options that allows a user to change the characteristics of a selected image. For example, the user can be provided options to define a print area within the image (constrained or unconstrained), select a final size, crop the image, rotate, change the colors of the image, perform color correction, change brightness/contrast, add a border or other optical effects, add text to the image, or any desire image modification or enhancement desired.

[0030] Based on selected characteristics such as the original image's resolution and the final selected image size, the image processing logic **315** can be configured to calculate an optimal resolution based on the image size and can scale the image data appropriately. A print preview of the processed image data can be displayed to the user for approval. Once the image is approved by the user, the image data is sent to a large format print system **325** which is internal to the kiosk **300** and a large format print is generated onto a print media. In general, a large format print can be an image greater than 8"x10", for example, 11" x 17", 12" x 18", 24" x 36", and other sizes.

[0031] With further reference to **Figure 3A**, in another embodiment of the kiosk system **300**, a content database **330** can be provided. The content database **330** can be a data store configured as a library containing image content, also referred to as image objects, that are available to users to print directly, combine with other image content, and/or include into a poster or other final printed image. For example, borders or clip art can be used to enhance a photograph or can be printed as a stand alone poster. Examples of content may include digital images of artwork, text, photographs, special effects, movie posters, borders, foreground/background overlay images or scenes, or any desired type of image or effect. The content may be obtained by generating each image and storing it within the kiosk **300** and/or by licensing and receiving the content from third parties. It will be appreciated that the content may be maintained in the kiosk in a variety of data stores and/or data structures including a database, linked lists, files, directories, objects or other desired way of organizing the content.

[0032] Once a user has either inputted an image into the kiosk to be produced in poster size and/or added content from the content database **330**, the image is scaled to a desired size (e.g. 24" x 36") and the large format print system **325** reproduces the image on a printable medium. Examples of large format print system **325** configured to print large format image sizes can include an ink jet printer, an laser printer, a thermal printer. One example is an Epson 7600 model which is an ink jet printer. Of course, other types of ink-jet printers, laser-jet printers, or other types of large format print mechanisms may be used.

[0033] The large format print system **325** can include an image forming mechanism configured to generate an image onto print media. As described previously, the image forming mechanism may vary based on the type of imaging desired and may include a laser imaging mechanism, other toner-based imaging mechanisms, an ink jet mechanism, digital imaging mechanism, thermal printing mechanisms, or other imaging reproduction engine. One or more processors (not shown) may be included that is implemented with logic to control the operation of the large format print system **325**. In one example, the processor includes logic that is capable of executing Java instructions. Other components of the large format print system **325** are not described herein but may include media handling and storage mechanisms, sensors, controllers, and other components involved in the imaging process.

[0034] In another embodiment, the kiosk **300** may include network logic (not shown) configured to communicate with a local network **335**. With network communication, the

kiosk **300** can transmit a final image through the local network **335** to an imaging device **340** for large format printing rather than performing the printing internally. This configuration may be used in a setting where users access the kiosk **300** but the imaging device **340** is controlled elsewhere. For example in a Kinko's establishment, the kiosk **300** may be accessible to customers but the imaging device **340** may be behind a counter operated by employees.

[0035] Illustrated in **Figure 3B** is another example of the kiosk **300** that includes a search engine **345** and a payment logic 350. The search engine **345** can be configured to process search queries from a user trying to locate desired content from the content database **330.** For example, the search engine **345** can provide an graphical interface that allows a user to input search criteria such as key words, categories, artist name, or other type of search criteria. The content database **330** can then be searched for content that matches or closely matches the search criteria. Results from the search can then be displayed to the user for selection. The search engine **345** can be embodied as software.

[0036] The payment logic **350** can be configured to request and process payments from a user for use of the kiosk system 300. In one example, the payment logic **350** can include a device for accepting cash payments and/or a device for accepting and processing credit/debit card payments. Based on the type of printing selected by a user, the cost associated the printing can be displayed and requested from the user. Upon receiving satisfactory payment, the payment logic **350** can transmit a signal that indicates such payment and that printing of the user request can proceed. The signal can also be sent to, for example, a receipt printer **355** that is caused to print a receipt and may include a bar code or other markings to associate the receipt to the current printing transaction.

[0037] Illustrated in **Figure 4** is another embodiment of a kiosk image processing system **400** that includes network communication logic **405** that allows communication with the Internet **410** or other type of network. For example, a content database **405** may be maintained remotely and that can be accessed by a user through an Internet connection established by the network communication logic **405**. The content database **415** can be similar to the database **330**. Similar search capabilities may be included as in the embodiment where the content database is maintained within the kiosk **300**. It will also be appreciated that a local area network may be used to maintain the content database **415** for use by the kiosk **400**. With access to the content database **415**, a user can search for desired

content that can be combined with an image to produce a desired output image. With the content database **415** that is network accessible, the content database **415** can be a common centralized library of image content that is accessed by multiple kiosk systems positioned in multiple locations. One of ordinary skill in the art will further appreciate that a kiosk system may be configured to contain any combination of features from the other described kiosk examples.

[0038] With further reference to **Figure 4**, one embodiment of a monitoring system is shown that is configured to monitor a variety of states and conditions within the kiosk **400**. A monitoring logic **420** can be configured to track usage of the kiosk and store usage data and statistics within one or more log files **425**. For example, the monitoring logic **420** may track how often the kiosk is used, how many users abort a print session before completion, a number of failed prints, statistics on which content was used and its frequency of use, which output poster sizes are used most often, and other usability statistics. By tracking which images from the content database **330/415** are used, the monitoring logic **420** can calculate any necessary licensing fees to be paid based on licensing agreements associated with the content.

[0039] The monitoring logic **420** may also be configured to monitor physical components and states within the kiosk **400**. For example, one or more sensors **430** may be included within the kiosk **400** which communicate with the monitoring logic **420**. The sensors **430** can also be configured to provide signals to the processor (not shown) of the kiosk **400**. For example, sensors **430** may be included to monitor and provide signals relating to the paper level, the ink or toner level within the print system, wear levels of one or more components within the kiosk and/or the print system, and/or other components. The monitored and measured states within the kiosk **400** may then be accessed remotely through a Internet connection by a remote computer **435** operating a monitoring logic **440**. In this manner, a system administrator or other person may access data from one or more kiosk systems **400** remotely by reading the monitored data recorded by each kiosk's monitoring logic **420**. From the monitored data, decisions can be made as to when to replace paper, replace ink/toner, whether a kiosk needs repairs, and the like. The monitoring logic **440** may also be used to remotely push updates and/or upgrades of software on the kiosk system **400**.

[0040] The monitoring logic **420** can also be configured to track usage of the one or more image objects in the content database **415** and provide usage data for maintaining the content

database **415**. The content database **415** can be maintained by, for example, removing unused or out-dated content, adding new content, modifying existing content, and so on. It will be appreciated that the monitoring logic **420** can also be included in the other kiosk configurations described herein, and which may include monitoring an internal content database such as the content database **330**.

[0041] Illustrated in **Figure 5** is one embodiment of a methodology **500** associated with the operation of a kiosk to generate a large format print. The illustrated elements denote "processing blocks" and represent computer software and/or processor instructions or groups of instructions that cause a computer or processor to perform an action(s) and/or to make decisions. Alternatively, the processing blocks may represent functions and/or actions performed by functionally equivalent circuits such as a digital signal processor circuit, an application specific integrated circuit (ASIC), or other logic device. The diagram does not depict syntax of any particular programming language. Rather, the diagram illustrates functional information one skilled in the art could use to fabricate circuits, generate computer software and/or firmware, or use a combination of hardware and software to perform the illustrated processing. It will be appreciated that electronic and software applications may involve dynamic and flexible processes such that the illustrated blocks can be performed in other sequences different than the one shown and/or blocks may be combined or, separated into multiple components. They may also be implemented using various programming approaches such as machine language, procedural, object oriented and/or artificial intelligence techniques. The foregoing applies to all methodologies described herein.

[0042] With reference to **Figure 5**, once a user initiates a printing process with a kiosk system, the system prompts the user for an input image to be used and receives the image **(Block 505)**. Image data corresponding to the input image may be received by reading a physical image such as by scanning a photograph, reading a data file from a disk or other computer-readable medium, selecting an image from a content database, or by other means. The system can then prompt for and wait to receive a desired final output size **(Block 510)**. If desired, the image data may be manipulated based on a variety of user selections **(Block 515)** so that a desired effect can be achieved. For example, image properties may be changed including lightness, darkness, contrast, defining an imaged region by cropping, adding a border or other image effects, zooming selected regions, overlaying other images, performing color correction or other image-altering algorithms. Based on a desired final size, the image

data can be scaled to that size (**Block 520**). With this, an optimization algorithm may be performed to determine an optimal resolution of the image based on the output size selected (**Block 525**). If the original input image has a low resolution or quality that may be distorted once scaled to a larger size, the system may warn the user and allow the user to change the output size if desired.

[0043] At any time during the process, a user may request a preview of the final image and the system would display a preview of a final output image, for example, as a poster (**Block 530**). The process may also include payment options that prompt for and receive payment from the user based the printing options selected (**Block 535**). For example, the cost of printing an enlarged image can vary based on a number of prints requested, the size of the output image, the type of print medium selected, and the like. Payment can be received for example by a credit card reader, a cash receiving mechanism, or other payment receiving means. Once the payment is accepted, the output image is printed in the size selected (**Block 540**). It will be appreciated that the system can be configured to reproduce images of any size relative to the original input image and may even generate smaller, scaled-down images.

[0044] In general, the described kiosk image processing systems can be configured to provide a tutorial-like process that is easy to use and follow. For example, the tutorial-like process can be implemented through the user interface logic **305** and image processing logic **110/315**. Any of the kiosks **100, 300, 400** can be configured to display a series of prompts on its display so that a user can easily select various options through touch-screen technology or other type of input formats. The image input device can allows a user/customer to easily select/input an original image including photographs, 35mm slides, digital images from a digital camera, compact disc, DVD, negatives, or images from a content library. The image processing logic can then produce quality image reproductions of various sizes. Using an ink-jet print system, the system can produce posters including sizes of 24, 36 and 44 inches wide. Of course, other sizes may be obtained and other types of print systems can be used. The enlarged output images (e.g. posters) can be generated on-demand within a few minutes. However it will be appreciated that, as printing technology improves, the speed of the system can improve.

[0045] While for purposes of simplicity of explanation, the illustrated methodologies are shown and described as a series of blocks, it is to be appreciated that the methodologies are not limited by the order of the blocks, as some blocks can occur in different orders and/or

concurrently with other blocks from that shown and described. Moreover, less than all the illustrated blocks may be required to implement an example methodology. Furthermore, additional and/or alternative methodologies can employ additional, not illustrated blocks.

[0046] While the illustrated flowcharts show various actions occurring in serial, it is to be appreciated that various actions could occur substantially in parallel. While each figure shows and describes a certain number of processes, it is to be appreciated that a greater and/or lesser number of processes could be employed and that lightweight processes, regular processes, threads, and other approaches could be employed.

[0047] In one example, methodologies described herein can be implemented as processor executable instructions and/or operations stored on a computer-readable medium. Thus, in one example, a computer-readable medium may store processor executable instructions operable to perform a method that includes some or all the processes of **Figure 2** and/or **Figure 5**. While the above method is described being stored on a computer-readable medium, it is to be appreciated that other example methods described herein can also be stored on a computer-readable medium.

[0048] **Figure 6** illustrates an example of a computer system **600** that can be configured to act as a kiosk image processing system or that can be internal to a kiosk image processing system as described previously and act as a processing logic. The computer system **600** can include a processor **602**, a memory **604**, a disk **606**, input/output ports **610**, and a network interface **612** operably connected by a bus **608**. The computer **600** may also include an image processing logic **630** similar to the example systems described herein. The image processing logic **630** may include, for example, a logic that performs the example executable methods described herein. It is to be appreciated that other computers may also be employed with the systems and methods described herein. An image forming device **635** can be operably connected to the computer system **600** where the image forming device **635** can be implemented as described previously relating to the large format print system, and may be permanently and/or removably attached to computer **600**.

[0049] The processor **602** can be a variety of various processors including dual microprocessor and other multi-processor architectures. The memory **604** can include volatile memory and/or non-volatile memory. The non-volatile memory can include, but is not limited to, read only memory (ROM), programmable read only memory (PROM),

electrically programmable read only memory (EPROM), electrically erasable programmable read only memory (EEPROM), and the like. Volatile memory can include, for example, random access memory (RAM), synchronous RAM (SRAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), double data rate SDRAM (DDR SDRAM), and direct RAM bus RAM (DRRAM). The disk **606** can include, but is not limited to, devices like a magnetic disk drive, a floppy disk drive, a tape drive, a Zip drive, a flash memory card, and/or a memory stick. Furthermore, the disk **606** can include optical drives like, a compact disc ROM (CD-ROM), a CD recordable drive (CD-R drive), a CD rewriteable drive (CD-RW drive) and/or a digital versatile ROM drive (DVD ROM). The memory **604** can store processes **614** and/or data **616**, for example. The disk **606** and/or memory **604** can store an operating system that controls and allocates resources of the computer **600**.

[0050] The bus **608** can be a single internal bus interconnect architecture and/or other bus architectures. The bus **608** can be of a variety of types including, but not limited to, a memory bus or memory controller, a peripheral bus or external bus, and/or a local bus. The local bus can be of varieties including, but not limited to, an industrial standard architecture (ISA) bus, a microchannel architecture (MSA) bus, an extended ISA (EISA) bus, a peripheral component interconnect (PCI) bus, a universal serial (USB) bus, and a small computer systems interface (SCSI) bus.

[0051] The computer **600** can be configured to interact with input/output devices **618** via input/output ports **610**. Input/output devices **618** can include, but are not limited to, a keyboard, a microphone, a pointing and selection device, cameras, video cards, displays, and the like. The input/output ports **610** can include but are not limited to, serial ports, parallel ports, and USB ports.

[0052] The computer **600** can operate in a network environment and thus can be connected to network devices **620** by a network interface (NIC), not shown. Through the network devices **620**, the computer **600** may interact with a network. Through the network, the computer **600** may be logically connected to remote computers. The networks with which the computer **600** may interact include, but are not limited to, a local area network (LAN), a wide area network (WAN), and other networks. The network interface can connect to LAN technologies including, but not limited to, fiber distributed data interface (FDDI), copper distributed data interface (CDDI), Ethernet/IEEE 802.3, token ring/IEEE 802.5, wireless/IEEE 802.11, Bluetooth, and the like. Similarly, the network interface can connect

to WAN technologies including, but not limited to, point to point links, circuit switching networks like integrated services digital networks (ISDN), packet switching networks, and digital subscriber lines (DSL).

[0053] The image forming device **635** may also include an image forming mechanism configured to generate an enlarged output image onto print media from print-ready image data. The image forming mechanism may vary based on the type of the imaging forming device **635** and may include a laser imaging mechanism, other toner-based imaging mechanisms, an ink jet mechanism, digital imaging mechanism, thermal printing mechanism, or other imaging reproduction engine. A processor (not shown) may be included within the image forming device **635** that is implemented with logic to control the operation of the image forming device **635**. In one example, the processor can include logic that is capable of executing Java instructions. Other components of the image forming device **635** are not described herein but may include media handling and storage mechanisms, sensors, controllers, and other components involved in the imaging process.

[0054] While example systems, methods, and so on have been illustrated by describing examples, and while the examples have been described in considerable detail, it is not the intention of the applicants to restrict or in any way limit the scope of the appended claims to such detail. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the systems, methods, and so on described herein. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention, in its broader aspects, is not limited to the specific details, the representative apparatus, and illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of the applicants' general inventive concept. Thus, this application is intended to embrace alterations, modifications, and variations that fall within the scope of the appended claims. Furthermore, the preceding description is not meant to limit the scope of the invention. Rather, the scope of the invention is to be determined by the appended claims and their equivalents.

[0055] To the extent that the term "includes" or "including" is employed in the detailed description or the claims, it is intended to be inclusive in a manner similar to the term "comprising" as that term is interpreted when employed as a transitional word in a claim. Furthermore, to the extent that the term "or" is employed in the claims (e.g., A or B) it is

intended to mean "A or B or both". When the applicants intend to indicate "only A or B but not both" then the term "only A or B but not both" will be employed. Thus, use of the term "or" herein is the inclusive, and not the exclusive use. See, Bryan A. Garner, A Dictionary of Modern Legal Usage 624 (2d. Ed. 1995).